

35 USC §102

Claims 12, 14 and 17-19 are herein rejected under 35 USC §102(b) as being anticipated by Fulford, Jr. et al. (US 6,008,109). The Applicant respectfully disagrees.

Claim 12 recites “A method of forming a shallow trench isolation structure, comprising: forming a trench in a substrate having a surface, and depositing a first compound into the trench using spin-on deposition; **partially removing the first compound from the trench** such that an upper surface of the compound is below the surface of the substrate; and depositing a second compound onto the substrate surface and onto the upper surface of the first compound by chemical vapor deposition.” (emphasis added)

Fulford, Jr et al. (Fulford) teaches a process for forming a trench isolation structure which includes forming a low K dielectric material within the trench such that its upper surface is level with the upper surface of the substrate or forming a low K dielectric material within the trench such that its upper surface is below the upper surface. Fulford teaches that the dielectric material is either formed level with the surface of the substrate or formed below the surface of the substrate. Therefore, among other reasons, Fulford does not disclose the claimed invention, which contains in part that the first compound is partially removed from the trench. Further, after a fair reading of Fulford, one with ordinary skill in the art of electronic components and electronic component assembly would not be able to comprehend that the dielectric material is added to the trench and then partially removed, given that Fulford never discusses or claims this option.

In addition, Fulford does not teach all of the claimed elements of the present application. “Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration.” *W. L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983) (citing *Soundsciber Corp. v. United States*, 360 F.2d 954, 148 USPQ 298, 301 (Ct. Cl.), *adopted*, 149 USPQ 640 (Ct. Cl. 1966)) Further, the prior art reference must disclose each element of the claimed invention “**arranged as in the claim**”. *Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984)(citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)). Fulford does

not teach a method for forming a shallow trench isolation structure where the first compound is partially removed from the trench such that an upper surface of the compound is below the surface of the substrate. Based on this argument, along with others such as that discussed above, Fulford does not anticipate claim 12 of the present application because Fulford is lacking and/or missing at least one specific feature or method recitation found in the present application, and in claim 12. Claim 12 is therefore allowable as not being anticipated by Fulford. Further, Fulford does not anticipate claims 14 and 17-19 of the present application by virtue of their dependency on claim 12.

Claims 12 and 13 are herein rejected under 35 USC §102(e) as being anticipated by Gardner et al. (US 6,194,283). The Applicant respectfully disagrees.

Claim 12 recites "A method of forming a shallow trench isolation structure, comprising: forming a trench in a substrate having a surface, and **depositing a first compound into the trench using spin-on deposition**; partially removing the first compound from the trench such that an upper surface of the compound is below the surface of the substrate; and depositing a second compound onto the substrate surface and onto the upper surface of the first compound by chemical vapor deposition." (emphasis added)

Gardner et al. (Gardner) teaches a method of forming an isolation trench in a semiconductor substrate that is substantially free of voids, wherein an oxide layer is formed in the trench and all layers and materials are applied by vapor deposition. Therefore, among other reasons, Gardner does not disclose the claimed invention, which contains in part that the first compound is deposited by spin-on deposition. Further, after a fair reading of Gardner, one with ordinary skill in the art of electronic components and electronic component assembly would not be able to comprehend that the materials or layers could be deposited by any other method other than vapor deposition methods, given that Gardner never discusses or claims this option.

In addition, Gardner does not teach all of the claimed elements of the present application. "Anticipation requires the disclosure in a single prior art reference of each element of the claim

under consideration.” *W. L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983) (citing *Soundsciber Corp. v. United States*, 360 F.2d 954, 148 USPQ 298, 301 (Ct. Cl.), *adopted*, 149 USPQ 640 (Ct. Cl. 1966)) Further, the prior art reference must disclose each element of the claimed invention “**arranged as in the claim**”. *Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)). Gardner does not teach a method of depositing a first compound into the trench using spin-on deposition. Based on this argument, along with others such as that discussed above, Gardner does not anticipate claim 12 of the present application because Gardner is lacking and/or missing at least one specific feature or method recitation found in the present application, and in claim 12. Claim 12 is therefore allowable as not being anticipated by Gardner. Further, Gardner does not anticipate claim 13 of the present application by virtue of its dependency on independent claim 12.

Claims 20-21 and 23 are rejected under 35 USC §102(a) as being unpatentable over Endisch et al. (US 6,140,254 B1). The Applicant disagrees, especially in view of the MPEP and of the Declaration under 35 USC §1.132 attached herein.

The following is a quotation of MPEP 608.01 (n) page 600-70, column 2, paragraph 3:

“Examiners are reminded that a dependent claim is directed to a combination including everything recited in the base claim and what is recited in the dependent claim. **It is this combination that must be compared to the prior art, exactly as if it were presented as one independent claim.**” (Emphasis added).

In re Fritch reiterates MPEP § 608.01 (n) by stating that:

“dependent claims are non-obvious if the independent claims from which they depend are non-obvious...”. (972 F.2d 1260, 1266; 23 USPQ2d 1780, 1784 (Fed. Cir. 1992)). (Emphasis

added).

Claims 20-21 and 23 of the present application are dependent on independent claim 12. Claim 12 is deemed not anticipated, and thus is allowable, by the Examiner in Paper No. 5 with regard to the Endisch reference. Therefore, claims 20-21 and 23 must be allowable by virtue of their dependency on claim 12.

Aside from the above argument and according to the attached Declaration, the following are true:

- a. Both the above-referenced application and US 6,140,254 were originally commonly owned by AlliedSignal Inc. at the time the later invention was made.
- b. Both the above-referenced application and US 6,140,254 have been subsequently assigned to Honeywell International Inc.
- c. Both the above-referenced application and US 6,140,254 share a common inventor: Denis H. Endisch.

Therefore, based on the attached Declaration, the US 6,140, 254 reference can properly be removed as a prior art reference in this matter. Further, since US 6,140,254 can be removed as a prior art reference, claims 12, 20-21 and 23 are allowable as not anticipated by the Endisch cited reference.

35 USC §103

Claims 15-16 are herein rejected under 35 USC §103(a) as being unpatentable over Gardner et al. (US 6,194,283) in view of Koyanagi (US 6,191,002). The Applicant respectfully disagrees.

The following is a quotation of MPEP 608.01 (n) page 600-70, column 2, paragraph 3:

“Examiners are reminded that a dependent claim is directed to a combination including everything recited in the base claim and what is recited in the dependent claim. *It is this combination that must be compared to the prior art, exactly as if it were presented as one independent claim.*” (Emphasis added).

In re Fritch reiterates MPEP § 608.01 (n) by stating that:

“dependent claims are non-obvious if the independent claims from which they depend are non-obvious...”. (972 F.2d 1260, 1266; 23 USPQ2d 1780, 1784 (Fed. Cir. 1992)). (Emphasis added).

Claims 15 and 16 of the present application are dependent on independent claim 12. Claim 12 is deemed not obvious, and thus is allowable, by the Examiner in Paper No. 5 with regard to the Gardner and Koyanagi references. Therefore, claims 15 and 16 must be allowable by virtue of their dependency on claim 12.

Aside from the above argument, claim 12 recites “A method of forming a shallow trench isolation structure, comprising: forming a trench in a substrate having a surface, and **depositing a first compound into the trench using spin-on deposition**; partially removing the first compound from the trench such that an upper surface of the compound is below the surface of the substrate; and depositing a second compound onto the substrate surface and onto the upper surface of the first compound by chemical vapor deposition.” (emphasis added)

Gardner et al. (Gardner) teaches a method of forming an isolation trench in a semiconductor substrate that is substantially free of voids, wherein an oxide layer is formed in the trench and all layers and materials are applied by vapor deposition. Therefore, among other reasons, Gardner does not disclose, teach or suggest the claimed invention, which contains in part that the first compound is deposited by spin-on deposition. Further, after a fair reading of Gardner, one with ordinary skill in the art of electronic components and electronic component assembly would not be able to

comprehend that the materials or layers could be deposited by any other method other than vapor deposition methods, given that Gardner never discusses or claims this option. And based on this argument, among others, claim 12 of the present application is not obvious in view of Gardner. Further, claims 15 and 16 are not obvious in view of Gardner by virtue of their dependency on claim 12.

Koyanagi teaches a method of forming a trench isolation structure wherein the oxide film of the silicon covering the main surface of the substrate is selectively removed leaving a part of the oxide film above the surface of the substrate that is used as an isolation dielectric of a trench isolation structure (see Abstract and Figures). Therefore, among other reasons, Koyanagi does not disclose, teach or suggest the claimed invention, which contains in part that the first compound is partially removed such that the upper surface of the compound is below the surface of the substrate. Further, after a fair reading of Koyanagi, one with ordinary skill in the art of electronic components and electronic component assembly would not be able to comprehend that the materials or layers could be removed in such a way that the dielectric or oxide material is above the surface of the substrate, given that Koyanagi never discusses or claims this option. And based on this argument, among others, claim 12 of the present application is not obvious in view of Koyanagi. Further, claims 15 and 16 are not obvious in view of Koyanagi by virtue of their dependency on claim 12.

Finally, with regard to the present rejection, there is no motivation or suggestion to combine or modify the Gardner reference in view of Koyanagi, especially given the fact that Gardner does not teach, suggest or disclose spin-on deposition of materials and given the fact that Koyanagi does not teach, suggest or disclose removing the oxide material in such a way where the surface of the oxide material is below the surface of the substrate. Based on this argument, among others including those discussed above, claim 12 is allowable as patentable over Gardner in view of Koyanagi. Further, claims 15 and 16 are allowable as patentable over Gardner in view of Koyanagi by virtue of their dependency on independent claim 12.

Claim 22 is herein rejected under 35 USC §103(a) as being unpatentable over Endisch et al. (US 6,140,254) in view of Kurosawa et al (US 6,011,123). The Applicant respectfully disagrees.

The following is a quotation of MPEP 608.01 (n) page 600-70, column 2, paragraph 3:

“Examiners are reminded that a dependent claim is directed to a combination including everything recited in the base claim and what is recited in the dependent claim. *It is this combination that must be compared to the prior art, exactly as if it were presented as one independent claim.*” (Emphasis added).

In re Fritch reiterates MPEP § 608.01 (n) by stating that:

“dependent claims are non-obvious if the independent claims from which they depend are non-obvious...”. (972 F.2d 1260, 1266; 23 USPQ2d 1780, 1784 (Fed. Cir. 1992)). (Emphasis added).

Claim 22 of the present application is dependent on independent claim 12. Claim 12 is deemed not obvious, and thus is allowable, by the Examiner in Paper No. 5 with regard to the Endisch and Kurosawa references. Therefore, claim 22 must be allowable by virtue of its dependency on independent claim 12.

Aside from the above argument and according to the attached Declaration, the following are true:

- a. Both the above-referenced application and US 6,140,254 were originally commonly owned by AlliedSignal Inc. at the time the later invention was made.
- b. Both the above-referenced application and US 6,140,254 have been subsequently assigned to Honeywell International Inc.
- c. Both the above-referenced application and US 6,140,254 share a common inventor: Denis H. Endisch.

Therefore, based on the attached Declaration, the US 6,140,254 reference can properly be removed as a prior art reference in this matter. Further, since US 6,140,254 can be removed as a prior art reference, claim 22 is allowable as not obvious in view of the Endisch reference.

In light of the removal of Endisch as a prior art reference in this matter, claim 12 is allowable as being patentable, especially since Koyanagi cannot be used alone as a reference to deem claim 12 unpatentable. Furthermore, claim 22 is allowable by virtue of its dependency on independent claim 12.

CHANGE OF FIRM NAME

For your immediate reference, the firm of Fish & Associates, LLP – which may have been recently listed on the correspondence for the Applicant – has merged with the law firm of Rutan & Tucker, LLP to collectively become the law firm of Rutan & Tucker, LLP as of January 1, 2002. New Power of Attorney forms will not need to be filed, however, since the Attorneys of Record have not changed through this merger.

REQUEST FOR ALLOWANCE

Claims 12-23 are pending in this application. The applicants request allowance of all pending claims.

Respectfully submitted,
Rutan & Tucker, LLP

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